below the mean which will each be about double of the numbers recorded above.

10. Regarding the rainfall values as representing the meteorological result of the sun's action, let us now compare these with declination range values, which may be taken to represent the sun's magnetic effect. Prof. Loomis has compiled (*American Journal of Science and Arts*, second series, vol. l. p. 153) what seems to be a very good table, exhibiting a set of yearly values of magnetic declination range, extending with slight breaks from 1777 to 1868.

Let us take this table, and treat it precisely as we have treated the rainfall, except that it does not seem necessary to make any attempt at equalisation, such as that made in Art. 8.

We thus obtain the following result :—

Name of station.	Proportional declination range inequality as exhibited by series of 8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.
Prague, or reduced to Prague	3·37	3·39	10·07	4·66	9·33	4·09	4·98

Here we have unmistakable maxima corresponding to ten and twelve years. The result is thus not unlike that which we have derived from rainfall observations ; indeed we could hardly expect a more perfect correspondence between the two, bearing in mind the limited amount of observations which we have for determining inequalities of long periods.

DEEP-SEA DREDGING AND LIFE IN THE DEEP SEA[1]

AS Dr. Carpenter explained in his lecture here some short time ago, four-elevenths, or nearly three-fourths of the surface of the earth is covered by sea. The average depth of the ocean is, according to the latest calculations of Mr. Otto Krummell, about 1,877 fathoms, or somewhat over two miles, very nearly the distance from the Royal Institution to the top of Primrose Hill. If we try and project Primrose Hill directly under our feet, keeping the distance the same, we shall form a conception of the mean depth of the sea. The greatest depth known to exist was discovered by the United States ship *Tuscarora* near the Kurile Islands, in the North-east Pacific. It is 4,655 fathoms, or about five miles and a quarter.

The highest mountain existing is of about the same height as the deepest sea is deep. Mount Everest is 4,833 fathoms in height. So insignificant, however, is the total volume of the land raised above sea-level in proportion to the vast cavity occupied by the sea, that were this cavity emptied of its water, the whole of the land now above sea-level could be shovelled into it twenty-two and a half times over before it would be filled up to the present sea-level.

Nevertheless the depth of the oceans, great as it is, is as nothing in comparison with the vastness of their extent of surface. As Mr. Croll has said, the oceans in relation to their superficial area are as shallow as a sheet of water 100 yards in diameter and only an inch in depth.

The sides of the ocean-basins are not at all steep. They are mostly so little inclined that an ordinary locomotive engine could run up them in a straight line with ease. Their inclination is usually not more than three or four degrees or less. Around some oceanic islands the slope is greater. The steepest slope known is, as Capt. Tizard informs me, at Bermuda, where there is an inclination of nearly twenty degrees from the edge of the reef to 2,000 fathoms. There are no such things as mountains and valleys on the deep-sea bottom. Animals cannot slip down against their will into the depths, but must move deliberately into them, and travel a long journey to reach them.

[1] Friday Evening Lecture delivered at the Royal Institution on March 5, by H. N. Moseley, F.R.S., Assistant Registrar of the University of London.

The pressure exerted by the superincumbent water at great depths is so great as to be almost beyond conception. It amounts roughly to a ton on the square inch for every 1,000 fathoms of depth, about 166 times as much as the pressure to which we are subjected at the present moment. At the greatest depths the pressure is about four tons and a half. Vast though this pressure is, it is, however, only about one-eighth of that which Prof. Abel and Capt. Noble have measured, as produced in their experiments on gunpowder. The deep-sea animals, being completely permeated by fluids, are probably no more conscious of pressure acting upon them than we, and, so long as they move slowly from one depth to another, are most likely unaffected by the consequent changes of pressure.

With regard to the temperature of the deep-sea water, the conditions which would affect animals are comparatively simple. Nearly all over the ocean the temperature at 500 fathoms is as low as 40° F., and this is the case even immediately under the equator in the Atlantic and Pacific Oceans. Below 2,000 fathoms the temperature is never more than a few degrees above freezing-point, excepting in the peculiar cases of land-locked seas, such as the Sulu Sea.

FIG. 1.—Japanese dredge in action.

At comparatively small depths in the sea it is almost certainly entirely dark so far as sunlight is concerned. Prof. Forel found that in the Lake of Geneva, even at a depth of only 30 fathoms, photographic paper was entirely unacted on after protracted exposure. We can hardly believe that the red, green, or yellow rays can penetrate sea-water much further than those to which ordinary photographic paper is sensitive. It may safely be assumed that sunlight is entirely absent at a depth of 200 fathoms, probably at a much less depth. We dredged blind crustacea at a depth of 120 fathoms, and a blind isopod is found in the Lake of Geneva at a depth of about 55 fathoms.

In depths of 500 fathoms almost everywhere, everywhere in over 1,000 fathoms, there must be an entire absence of any currents in the water. Any movement taking place in the water at that depth must be of a molecular nature only, excessively slow and quite imperceptible to animals.

Altogether the deep sea, cold, dark, and still, must b about the slowest place to live in that can be imagined.

I now turn to the consideration of deep-sea dredging.

The dredge is an ancient contrivance of fishermen of a very wide distribution. It is used in Japan, and the accompanying amusing figure (Fig. 1) is taken from a woodcut in a Japanese book on the principal land and marine food products of Japan. In it a fisherman is

shown quietly smoking his pipe whilst his dredge tows astern catching bivalves (either a Cardium or a Pecten). For the sake of clearness the artist has represented the dredge as partly raised out of the water. On the margin is the description, which my friend, Mr. F. V. Dickins, has translated for me. The dredge is described as a basket net which is dragged from the stern of a boat scratching up sand and mud and the shell fish. The particular shell fish here being caught are explained to have been formerly considered poisonous, and it is said that they are even now not considered very good, and are never used in gentlemen's kitchens.

A great step in advance was made on board the *Challenger* in the introduction by Sir George Nares of the trawl-net as a substitute for the dredge in deep-sea investigation. Still both the sounding and trawling apparatus used on board the ship were very imperfect in comparison with the apparatus now employed. Mr. Alexander Agassiz, following Sir William Thomson's improvements in methods of sounding, has introduced the use of wire rope for trawling with, instead of the hempen rope which we used. The wire rope has most important advantages. It occupies only one-ninth of the space of the hempen rope on board the ship, being only one inch and a sixteenth in circumference. It is of galvanised steel wire with a hemp core. It is not as big as my little finger, and contrasts favourably with the large trawl ropes of the *Challenger*. The wire rope is heavy in the water, and need not be weighted when in use like the old rope. Moreover it can be let run out and be wound in at such a rate that three or four hauls can be got in one day in depths over which the *Challenger* consumed a whole weary day for one haul.[1] Mr. Agassiz has also improved the trawl-net. Our trawl was an ordinary beam trawl which might fall on its back on the bottom and be towed along in vain. This

FIG. 2.—Mr. A. Agassiz's deep-sea trawl.

one is, as will be seen from Fig. 2,[2] reversible. It has two beams instead of one, as in the old pattern, and these are fixed to the irons midway between the two margins of the mouth of the net, one of which will scrape the bottom on whichever side the trawl may fall. Mr. Agassiz has also used with great success a simple iron bar with twelve or fifteen swabs fastened on to it, and towed in a transverse position. With this machine he brought up on one occasion no less than 124 specimens of two large species of Pentacrinus at one haul.[3]

I pass now to the consideration of life in the deep sea. As Prof. Weismann of Freyburg well said in a lecture on the animal life of Lake Constance,[4] "The sea is the birthplace of all animal and plant life; from it animals and plants have spread themselves on the land and into the freshwaters which permeate it." This birthplace of the various forms of life lay, no doubt, in shallow water on the coasts, and thence has taken place the colonisation of the deep sea on the one hand and of the land on the other.

It is only animals, however, which have made their way into deep water. The absence of sunlight at great depths is entirely prohibitive of the existence there of plants. As far as I observed, we did not dredge any sea-weed in the *Challenger* Expedition from a greater depth than 33 fathoms. Edward Forbes, however, found ordinary sea-weeds in the Ægean Sea down to a depth of 79 fathoms,[5]

[1] A. Agassiz: "Dredging Operations of the U.S. Coast-Survey Steamer *Blake*," *Bull. Mus. Comp. Zool.* vol. v. No. 1, p. 7.
[2] *Ibid.*, vol. v. No. 6. [3] *Ibid.*, vol. v. No. 14, p. 296.
[4] Aug. Weismann, "Das Thierleben im Bodensee," s. 5. (Lindau: Stettner, 1877.)
[5] Brit. Ass. Report, 1844, p. 165.

though they were very scarce at that depth, and may possibly not have grown there, and Dr. Carpenter dredged Corallinaceæ in abundance in 150 fathoms in the Mediterranean.[1] The question of the exact limit of the different species of sea-weeds in depth, and of the absolute limit of plant-life altogether in the sea, is one of great importance, and which has received but little attention. It could easily be worked out by any yachtsman on our coasts.

In considerable depths only one plant is known to exist. It is a lowly-organised parasitic fungus, which infests corals, boring finely-ramified canals in their hard substance. This plant was found by Prof. Martin Duncan[2] in corals dredged from over 1,000 fathoms. Fig. 3

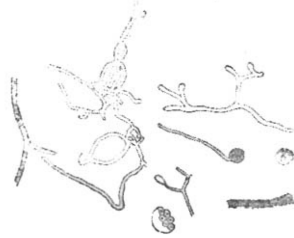

FIG. 3.—*Achlya penetrans*, Duncan.

gives a view of its appearance taken from Prof. Duncan's illustrations; you would hardly recognise it as a plant. It consists simply of a ramified mycelium and small spores. Like some other fungi which live in mines and cellars, it is able to live in the dark, because it nourishes itself upon the tissues of its hosts. It belongs to the same genus as a fungus that attacks the salmon in our rivers and kills them, and is hardly to be distinguished from that plant. It is an extremely ancient form, and infested corals even in Silurian times.[3]

Though plant life is so meagre, animal life is abundant

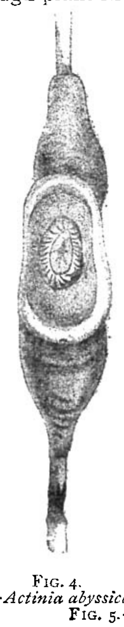

FIG. 4.

FIG 5.

FIG. 4.—*Actinia abyssicola* (Moseley). Attached to the stem of an Isis
FIG. 5.—*Edwardsia coriacea* (Moseley).

in the deep sea. There are hardly any of the groups of invertebrate animals which inhabit our shores which are not represented in deep waters. The only ones which I know of as absent, as far as yet observed, from depths of say 1,000 fathoms and more, are Planarian worms, and certain minute animals such as Rotifers, Tardigrades, and Infusoria. It is quite possible that these minute forms

[1] *Proc. R. Soc.*, 1872, p. 587. [2] *Proc. R. Soc.*, 1876, p. 238.
[3] *Quart. Jour. Geol. Soc.*, 1876, p. 205.

may exist in great depths, but it is as well to note that we have not as yet been able to detect them, possibly from want of adequate means and of proper search.

Many genera of animals, and even some species have a vast range of depth in the sea. Some of the animals common on our sea-shores are represented in very great depths by very closely allied species. As examples may be cited two sea anemones from deep water. The close resemblance of these to forms common in our aquariums will be recognised at once.

The one, *Actinia abyssicola* (Fig. 4), from 1,350 fathoms, belongs to the same genus as the commonest anemony exposed on the rocks all round our coast at low tide. In the deep sea, in the lack of rocks for it to spread its disc out flat upon, it is obliged, as in the specimen figured, to cling round the dead stem of an Alcyonarian coral, or to clasp some similar support. The other anemony (Fig. 5) belongs to the genus Edwardsia, also found on our coasts, and nearly resembles the English species, though it comes from 600 fathoms. It has a long cylindrical body, and covers its skin with a coating of small shells gathered from the bottom mud.

A curious sea-anemony of the genus Cerianthus, may also serve as an illustration. This anemony uses its thread-cells, which other anemonies and jelly-fishes use, as bathers know, to sting with, to build itself a house. It produces the cells, which are extremely large, in great quantity, felts the threads together, and thus constructs a tube in which it lives, burying the tube in the mud, and expanding itself at the mouth ready to dart down into safety when alarmed. The tube is about 4½ inches in actual length, and is covered with small foraminiferous shells from the bottom, woven into it. A closely-allied species lives in shallow water in the Mediterranean, and I found abundance of a huge species with the tube four times as long expanding its tentacles in a depth of only a foot of water at low tide in the full glare of a tropical sun at the Philippine Islands in water which felt quite hot to my feet. Yet this deep sea form, which differs from the others in little except its size, was dredged from 2,750 fathoms, and inhabits a region absolutely devoid of sunlight, and with a temperature always close on freezing point.

The simple coral, *Bathyactis symmetrica*, of which the accompanying figure (Fig. 6) represents a large specimen, magnified to three times the natural size, ranges through all depths from 30 fathoms to 2,900 fathoms, or three miles and a quarter, almost the greatest depth from which living animals have been obtained. The coral has a world-wide range, occurring in all parts of the Atlantic and Pacific and in the Indian Ocean. It varies very much in size, some specimens being extremely minute, but I have been unable to discover any relation between the size and the different conditions under which the various specimens lived. The size does not depend on depth, temperature, or the quality of the bottom, as far as I can make out.

When I speak of a coral I shall refer only to the skeleton of the animal. The figure above represents the hard skeleton of an animal like a sea-anemony. The soft tissues have been entirely removed.

In the cases of all groups of invertebrate animals, annelids, mollusca, crustacea, we find numerous similar instances of the wide range of modern shore genera, and even species into very great depths. For example, as Mr. Davidson shows, the Brachiopod *Terebratula vitrea* ranges from 5 to 1,456 fathoms, whilst the genus Waldheimia ranges from shore to 2,160 fathoms, and Discina from 50 to 2,425 fathoms. As Mr. P. H. Carpenter has shown, the genus Antedon of our coasts ranges down to 2,900 fathoms. Amongst the Ophiuridæ, as appears from Prof. Lyman's report, the genus Amphiura ranges from 2 to 2,650 fathoms. Prof. Ehlers long ago showed that deep-sea annelids and Gephyreans belong mostly to shallow-water genera. Myriochele occurs in 2,900 fathoms, Priapulus in 2,750 fathoms, Balanoglossus in 2,500 fathoms, and Dr. McIntosh has given me similar instances, and informs me that the common shallow-water annelid, *Lumbriconereis fragilis*, ranges down to 1,780 fathoms. From Mr. Boog Watson's account of the mollusca of the *Challenger* Expedition it appears that the common shore genus Dentalium ranges down to 2,600 fathoms. Amongst crustacea Peneid and Caridid shrimps extend to all depths, whilst the barnacle Scalpellum ranges down to 2,850 fathoms.

Although many forms have this wide range, there are certain well-marked deep-sea forms which are not met with in shallow water unless in Polar regions.

The accompanying figure (Fig. 7) represents a beautiful simple coral, *Odontocyathus coronatus*, from 390 fathoms off St. Thomas, in the West Indies, immediate allies of

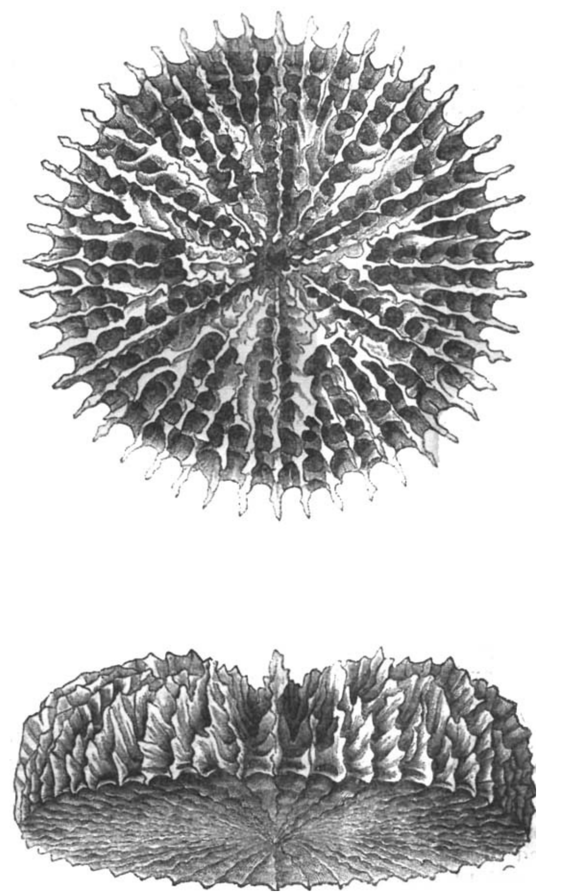

FIG. 6.—*Bathyactis symmetrica*. Three times the natural size. Viewed from above and edgewise.

which have not been found in shallow water. The coral is remarkable for having a wide flat base with tooth-like spokes all round its edge, no doubt a contrivance for keeping it upright as it rests on the mud at the sea bottom. The genus of corals, Stephanotrochus, may also be cited as confined at present, as far as known, to deep water. Four species of the genus were dredged by the *Challenger* in from 410 to 1,000 fathoms. All but one of them, which was obtained off New South Wales, were dredged in the Atlantic. The species here figured (Fig. 8) *Stephanotrochus diadema* was from 1,000 fathoms off the Azores.

There being scarcely any difference in the conditions of life from a depth of 500 fathoms downwards, the deep-sea fauna exhibits no zones of distribution in depth. Its upward limit rises in some parts of the world higher towards the coast line, in others lies lower, according to the varying conditions of light temperature-currents and

food. In the higher latitudes it approaches shallow water. In the Straits of Magellan we dredged blind crustacea and other elements of the deep-sea fauna in 120 fathoms; but even in the tropics the deep-sea fauna is met with at comparatively small depths. Off St. Thomas in the Danish West Indies, for example, deep-sea animals are extremely abundant at 450 fathoms.

From the upper limit of range the deep-sea fauna, speaking generally, extends downwards continuously, without break or defined limit of range of species or genera. We had not in the *Challenger* time to make series of dredgings to determine the upper limit of the deep-sea fauna. It may lie in the places cited much nearer to the surface than stated. At Cebu, in the Philippines, far within the tropics, vitreous sponges occur in abundance at 95 fathoms, and the deep-sea fauna may almost be said there to reach that upper limit, although the temperature at that depth is as high as 70° F. Mr. Agassiz,[1] who has so thoroughly explored the deep-sea off the east coast of North America and the West Indies, concludes in his latest report that the range of the deep-sea fauna should be carried as high as 300 or 350 fathoms. He terms the fauna extending from the shore to 150 fathoms the littoral fauna, whilst from the 100-fathom line to the 400-fathom line extend species which are neither littoral nor have the wide geographical distribution belonging to forms found below that depth. We might term the inhabitants of this interval the intermediate fauna. Dr. Günther tells me that he has arrived at similar conclusions from his examination of the deep-sea fish collected by the *Challenger* expedition. Below 350 fathoms no zones of depth are to be made out in their distribution.

The geological bearings of these facts are all-important. We shall never be able to tell from the fossil contents of strata whether they were deposited at 400 or 2,500 fathoms. Even more, since some species and very many genera range at present from the shore to vast depths, many forms now restricted to deep water may formerly have lived in less depths, and most probably did so. Moreover as the present deep-sea fauna varies so much in upward range in different places and climates, so also probably did it vary in geological times. We can therefore not even form conclusions of any value from these grounds as to the depths at which a deposit was formed, from 400 fathoms upwards, until the region of reef-coral and plant-life is reached. We must rely on other evidence.

The question would not be one of much importance if, as Prof. Geikie concludes, all the geological deposits with

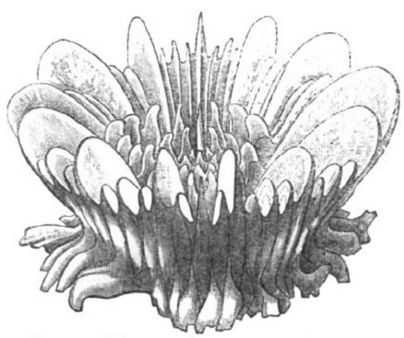

FIG. 7.—*Odontocyathus coronatus* (Moseley). Magnified to twice the natural size.

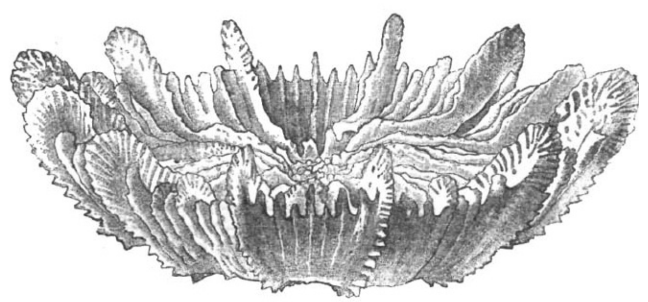

FIG. 8.—*Stephanotrochus diadema* (Moseley). Once and a half the natural size.

which we have to deal are shown, by containing ripple-marks and otherwise, to have been formed in shallow water,[2] but many geologists are, I believe, opposed to his views in this matter.

A most important feature of the deep-sea fauna is that it is world-wide in its distribution. I have already referred to a species of coral, *Bathyactis symmetrica*, which ranges all over the world. Fig. 9 represents another coral, *Cryptohelia pudica*, which is a hydroid allied to the jelly-fishes which float on the sea-surface, and not to sea-anemonies like the other corals I have shown. This is the common skeleton of a highly complex colony. Each of the small swellings on the branches contains a group of animals. In the centre of each group is lodged an animal with a mouth and stomach, and all round were others without mouths. The latter catch the food and give it to the central animal, which digests it and nourishes them and the whole coral tree by means of a complex system of canals. Other animals perform solely the function of rearing the young. The fully-developed larvæ are worm-like, and when ready escape and swim away to found each a new colony. For corals, like us, travel in their youth and see the world, and become stationary like us only in later life. Each group of animals is covered by a protective lid, hence the name of the coral, Cryptohelia. It occurs all over the world in from 350 to 1,500 fathoms.

Some few deep-sea forms appear to have a restricted range. I say appear, because we have dredged some few as yet only from one locality, but so little deep-sea dredging has been done that probably these will be found elsewhere in the future.

No better instance of the world-wide range of deep-sea forms can be cited than the fact that Portuguese fishermen fishing for deep-sea sharks in 450 fathoms off the coast of Portugal bring up the Glass-rope Sponge entangled on their lines, and that Japanese fishermen fishing off Inosima in more than 300 fathoms catch sometimes a shark of the same genus as that caught by the Portuguese, and bring up at the same time an almost identical sponge. The sponge reached England first from Japan.

There is absolutely nothing to restrict the geographical range of animals in the deep sea. Dr. Wallich, the pioneer of deep-sea research, eighteen years ago recognised the deep homothermal sea "As the great highway for animal migration, extending from pole to pole." Below 500 fathoms it is everywhere dark and cold, and there are no ridges that rise on the ocean bottom to within 500 fathoms of the surface, so as to bar the migration of animals in the course of generations from one ocean to another, or all over the bottom of any one of the oceans. The apparently shallow barriers seen in the map of Atlantic and Pacific have over 1,000 fathoms of water upon them.

Were there any variations in the conditions of life such as to restrict certain animals to very great depths, as mountain plants are restricted to certain heights on land, then we might expect to find a peculiar fauna in the deep

[1] *Bull.* Mus. Comp. Zool., vol. v. No. 14, p. 294.
[2] *Proc.* R. Geog. Soc., 1879, p. 426.

depressions, and especially in the deepest hollows on the bottom of the sea, where the water is over 4,000 fathoms deep; but such is not the case as far as we know. The deepest depressions lie in the North Pacific, the deepest of all being one close to the Kurile Islands, the soundings there being 4,655 fathoms.

Mr. Alexander Agassiz has glanced over and helped to sort the whole deep-sea collection made by the *Challenger*, and he believes that the collection made by the successive dredgings of the United States Government in deep water off the eastern coast of the United States and the West Indies contains almost all the types dredged by us all over the world. No better proof of the ubiquity of deep-sea species could be given. We got quite tired on the *Challenger* of dredging up the same monotonous animals wherever we went.

Many animals which occur in deep water in temperate and tropical regions occur in shallow water in high latitudes. Hence it is usually concluded that an Arctic or Antarctic fauna has colonised the deep sea; but probably it is also

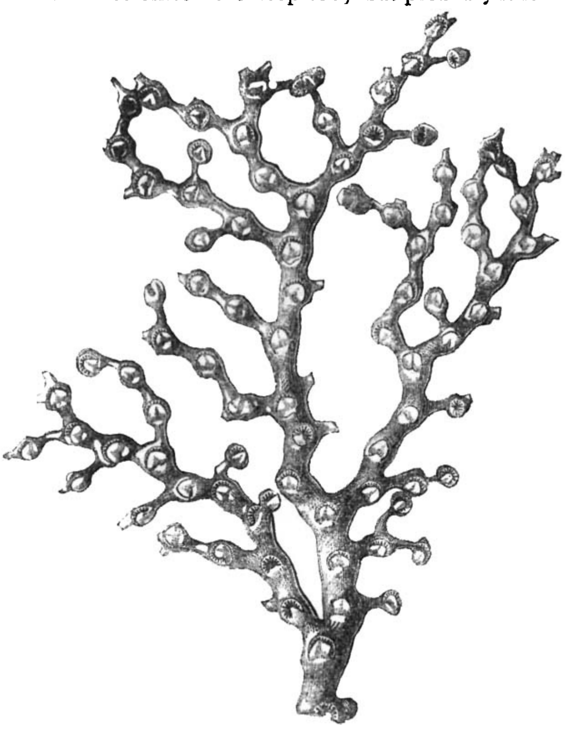

FIG. 9.—*Cryptohelia pudica* (M.Edw. & H.). Twice the natural size.

the case that deep-sea forms have moved up into shallow water in polar regions, because there the temperature is low and the water is dark during most of the year, both from the absence of sun or the obliquity of its rays, and because of the covering of the water by ice and snow. Probably colonisation has taken place in both directions. Some of the identical animal forms occurring at New Zealand and Great Britain may have moved up from deep water at both places.

The higher we rise into shallow water above the limit of the deep-sea fauna, the more restricted becomes the geographical range of the species occurring. I may cite an instance. Off the Aru Islands in the Malay Archipelago we dredged in 129 fathoms at the same haul a number of corals and other animals, nearly all of which we did not find elsewhere, and which I believe Mr. Agassiz has not found off the American coast.

(To be continued.)

NOTES

WE are sure our readers of all shades of politics must regret that Sir John Lubbock has lost his seat in Parliament. We have nothing to do with the immediate causes of his defeat, but for the sake of science and enlightened legislation we trust he may find some other constituency liberal enough in the best sense of the term, to choose him as its representative. Meantime his loss is to some extent made up for by the election of Prof. Maskelyne, though we trust the latter's duties as a legislator will not lead. to the neglect of what we consider his much higher function of original research.

WE have some further details concerning the new agricultural college about to be opened near Salisbury. Mr. John Wrightson, for many years Professor at Cirencester, and well known for his contributions to scientific agriculture, is converting his house and extensive farm near Downton into an institution which shall combine lands worked by himself with a teaching staff mainly composed of experienced professors once at the Royal Agricultural College. There is plenty of room, not for one new college only, but for half a dozen; and the present scheme commends itself to us in many ways. We feel sure that it will work in friendly rivalry with Cirencester, avoiding its mistakes while profiting by its experience. We would suggest that some shorter title than the "South Wiltshire and Hampshire Agricultural College" should be found for the new institution.

WE understand that Prof. Boyd Dawkins, F.R.S., of Owens College, Manchester, has accepted an invitation to give a course of lectures at the Lowell Institute, Boston, Mass., in October and November of this year.

THE eighteenth meeting of the delegates of the French Sociétes Savantes took place at the Sorbonne on March 31. M. Regnier, President of the Archeological Section, was the president at the inaugural sitting. He was assisted by M. Milne Edwards, President of the Science Section, and M. Delisle, President of the Historical Section. In his speech the President spoke in some detail of the heliographical reproduction of old manuscripts published recently in England. The Section of Science was divided as usual into three commissions. M. Allegret, Professor of the Faculty of Lyons, was appointed President of the Commission for Mathematics; M. Filhol, Professor to the Faculté des Sciences of Toulouse, President of the Commission for Physico-Chemical Science; and M. Cotteau President of the Commission of Natural Sciences. The General Sitting of Sciences were presided over by M. Milne-Edwards, assisted by M. Faye and M. Wurtz. The distribution of prizes took place on Saturday, April 3, under the presidency of M. Ferry, the Minister of Public Instruction. Prince Oscar of Sweden, Prof. Nordenskjöld, and Capt. Palander were present, and greatly cheered by undergraduates and spectators. Except the allusion to the high rewards, the speech of M. Ferry was almost entirely confined to educational topics. According to the proposals of the Commission of Sciences gold medals have been awarded to Dr. Crevaux for his explorations in Tropical America, M. Crova, Professor to the Faculté des Sciences de Montpelier, and M. Violle, Professor to the Faculté of Lyons, for their works in Physics; M. Pierre, as Director of the Botanical Garden of Saigon (Cochin-China), and MM. Chantre and Falsan for their studies of the old glaciers of the Rhone.

THE Italian Minister of Agriculture and Commerce has decided to present to Parliament a project for executing a great geological map of the kingdom. The expense is calculated at 6,000,000 francs.

SHOCKS of earthquake were felt at Tenez, on the Algerian coast, on March 2, at 8.30 p.m., and at Orleansville and Tenez on the 25th, at 5.20 a.m.